

EXHIBIT 2

REDACTED

**IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA
ALEXANDRIA DIVISION**

United States of America, *et al.*,

Plaintiffs,

v.

Google LLC,

Defendant.

Case No. 1:23-cv-00108-LMB-JFA

Hon. Leonie H. M. Brinkema

EXPERT REPORT OF ROSA M. ABRANTES-METZ, PH.D.

December 22, 2023

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revenues in 2022” with \$63.5 billion in the United States.⁹

B. Buyers and Sellers of Digital Web Display Advertising

31. On one side of the market for online web display advertising are *advertisers*, who purchase ad inventory to reach with their advertisements *users*, i.e., people viewing websites. On the other side of the market are *publishers*, who create valuable advertising inventory by attracting users to their websites.

i. Advertisers

32. Advertisers want to reach internet users to improve brand awareness or drive sales.¹⁰ Internet users are potential consumers. To reach users on the internet, advertisers purchase web display ad inventory on webpages and fill the space with *ad creatives*. Ad creatives are the text and pictures users can see when an advertisement loads on a webpage.¹¹
33. All manner of businesses may choose to advertise, including consumer packaged goods companies, retailers, restaurants, and many more. Advertisers can also include

⁹ “Internet Advertising Revenue Report,” PwC and IAB, April 2023, available at https://www.iab.com/wp-content/uploads/2023/04/IAB_PwC_Internet_Advertising_Revenue_Report_2022.pdf, last accessed December 4, 2023, at pp. 5 and 15. These revenue figures appear to include in-app display and closed-web display advertising which are not at issue in this matter (“Internet Advertising Revenue Report,” PwC and IAB, April 2023, available at https://www.iab.com/wp-content/uploads/2023/04/IAB_PwC_Internet_Advertising_Revenue_Report_2022.pdf, last accessed December 4, 2023, at pp. 24-25).

¹⁰ FBDOJGOOG_01197036, at p. 11 (Undated).

¹¹ “What Are Creatives,” Google Ad Manager Help, available at, <https://support.google.com/admanager/answer/3185155?hl=en>, last accessed December 14, 2023.

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government entities, like the U.S. Army, political candidates, and charitable organizations. Individual advertisers may work with advertising agencies to manage their advertising purchases. In this report I will refer to both individual advertisers and advertising agencies as “advertisers” unless otherwise noted.

34. Figure 4 identifies some large advertisers. A 2019 Google presentation identified Proctor & Gamble, Unilever, Toyota, and Samsung as among the “largest, [and] most strategic” global advertisers.¹² Google also identified Netflix, Nationwide, and Booking, the owner of brands like Priceline, Kayak and OpenTable, as “[l]arge” and “[s]ophisticated” digital advertisers.¹³

Figure 4: Examples of Advertisers as of 2019



35. Advertisers, as well as the tools and intermediaries that assist them in buying ad inventory, are referred to as the *buy-side* or *demand side* of the web display advertising

¹² GOOG-AT-MDL-002964201, at -201, -202, and -220 (January 29, 2019).

¹³ GOOG-AT-MDL-002964201, at -220 (January 29, 2019); and “Brands,” Booking Holdings, available at, <https://www.bookingholdings.com/brands/booking/>, last accessed December 14, 2023.

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48. As with direct transactions, indirect transactions can be settled programmatically or non-programmatically.

1. Non-Programmatic Indirect

49. *Non-programmatic indirect transactions* for open web display advertising can be facilitated by ad networks. Ad networks connect a set of advertisers to ad inventory from a set of publishers.³² In the non-programmatic indirect setting, advertisers purchase ad inventory “at fixed prices” from an ad network “offering packages which aggregate supply across multiple media owners.”³³ Since the advent of ad exchanges, ad networks also purchase inventory for their advertisers through exchanges.³⁴ Ad networks will be discussed further in Section II.E.i.1.

2. Programmatic Indirect

50. Ad exchanges enable *programmatic indirect transactions* of open web display advertising through Real Time Bidding (“RTB”). RTB is a type of programmatic advertising transaction that allows for the buying and selling of online web display advertising on a per-impression basis via real time auctions,³⁵ which can benefit both

³² GOOG-DOJ-03242646, at -670 (September 26, 2018); GOOG-DOJ-15128751, at -751 (Undated); and GOOG-DOJ-09141406, at -470 (July 30, 2014).

³³ GOOG-DOJ-03242646, at -670 (September 26, 2018).

³⁴ GOOG-DOJ-15128751, at -751 (Undated); and FBDOJGOOG_01197036, at p. 18 (Undated).

³⁵ These auctions can be open auctions, which are open to all advertisers using a particular ad exchange, or private auctions in which the publisher invites certain advertisers to bid on its inventory. (“Programmatic and Automation – The Publishers’ Perspective,” Interactive Advertising Bureau, available at https://www.iab.com/wp-content/uploads/2015/06/IAB_Digital_Simplified_Programmatic_Sept_2013.pdf, last accessed December 14, 2023, at pp. 1 and 3.)

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publishers and advertisers.³⁶ Publishers can monetize remnant ad inventory, while advertisers using RTB have “more control over who sees an ad, [and] when and where it is located on the website.”³⁷ Advertisers have this increased control because the ad impression is not purchased until the moment a user is loading a publisher’s website, and information about the specific impression can be shared with the advertiser before the advertiser decides the amount to bid, if any.³⁸

51. RTB is made possible through specialized intermediaries that “provide the fundamental infrastructure required for selling, buying, and serving ads in real time, typically within milliseconds.”³⁹ As discussed further below, these specialized intermediaries include publisher ad servers (“PAS”), ad exchanges, and demand side platforms (“DSP”). Together these intermediaries are referred to as the *ad tech stack*, and the industry is referred to as the *ad tech industry*.⁴⁰

D. Transaction Flow in Open Web Display Advertising

52. The four types of open web display transactions just discussed – non-programmatic

³⁶ GOOG-DOJ-04429792, at -795 (April 2017); and GOOG-DOJ-03242646, at -664 – 666 (September 26, 2018).

³⁷ GOOG-DOJ-03242646, at -665 and -666 (September 26, 2018); and Choi, Hana, Carl Mela, Santiago Balseiro, and Adam Leary, “Online Display Advertising Markets: A Literature Review and Future Directions,” *Information Systems Research* 31, no. 2 (2020): 556-575, at pp. 559–560.

³⁸ Choi, Hana, Carl Mela, Santiago Balseiro, and Adam Leary, “Online Display Advertising Markets: A Literature Review and Future Directions,” *Information Systems Research* 31, no. 2 (2020): 556-575, at pp. 559–563.

³⁹ Choi, Hana, Carl Mela, Santiago Balseiro, and Adam Leary, “Online Display Advertising Markets: A Literature Review and Future Directions,” *Information Systems Research* 31, no. 2 (2020): 556-575, at p. 558.

⁴⁰ GOOG-AT-MDL-004236722, at -739 (2016, Stack is an “[i]ntegrated set of tools that manage the end-to-end ad-buying process”).

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inventory – typically by 30% to 300%.¹⁹⁹ Similarly in 2009, PubMatic, a company which was considered a yield manager at the time, reported that its tools led to “30%-70% higher publisher revenue.”²⁰⁰

115. By 2011, 60% of DFP publishers were using a yield manager.²⁰¹ A Google document discussing “yield management options” described yield managers as “a real competitive threat to DFP” which could be countered by “adding yield functionality to DFP.”²⁰²

116. As discussed in Section II.G.iii.2, Google acquired the yield manager AdMeld in December 2011, and by 2013 Google had closed down AdMeld as a standalone product.²⁰³ After acquiring AdMeld, Google discontinued the feature which provided real-time bids to rival publisher ad servers.²⁰⁴ Beginning in 2014, Google enforced a policy which “restrict[ed] calling AdX from another yield manager or exchange.”²⁰⁵

¹⁹⁹ “Optimizing AdMeld style with Co-Founder Ben Barokas,” AdExchanger, April 8, 2009, available at <https://www.adexchanger.com/yield-management-tools/admeld-ad-exchange-optimization/>, last accessed December 5, 2023.

²⁰⁰ “Pubmatic’s Rajeev Goel Talks Yield Optimization,” AdExchanger, April 7, 2009, available at <https://www.adexchanger.com/yield-management-tools/pubmatic-rajeev-goel-ad-revenue-yield-optimization/>, last accessed December 5, 2023.

²⁰¹ GOOG-00000001, at -001 and -002 (March 15, 2011).

²⁰² GOOG-TEX-00113008, at -015 (Undated) (“Rubicon, AdMeld, and Pubmatic represent a very real competitive threat to DFP. Adding yield functionality to DFP directly counters that threat, and creates a gap between our offering ad server without Yield Management”).

²⁰³ Mohan, Neal, “Take a Walk on the Sell-Side,” Google, December 02, 2011, available at <https://googleblog.blogspot.com/2011/12/take-walk-on-sell-side.html>, last accessed December 5, 2023; and GOOG-DOJ-03606441, at -442 and -443 (September 1, 2012).

²⁰⁴ GOOG-DOJ-03606441, at -448 (September 1, 2012); GOOG-TEX-00075122, at -122 (February 13, 2012); GOOG-DOJ-04407352, at -352 (July 10, 2013); GOOG-DOJ-03610002, at -002 (Undated); GOOG-DOJ-04401026, at -029 (August 14, 2012).

²⁰⁵ GOOG-TEX-00149056, at -057 (Email chain starting on March 21, 2013); and GOOG-TEX-00149044, at -044 (March 22, 2013).

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customers if it charges a price that is higher than its rivals. This dynamic drives price towards marginal cost. If a firm, however, were to raise its price above marginal cost, and do so without losing many customers, the firm is said to possess market power.

ii. Consequences for Consumer Welfare

139. Firms that possess market power are generally able to increase prices, usually associated with a reduction in output.²³⁸ For the purposes of illustration, consider a town with only one internet service provider available. Rather than offering a price to just cover its costs (including opportunity costs of invested capital), it could be more profitable for the service provider to keep prices above costs and only serve customers willing to pay those higher prices. The service provider would be earning higher profits at the expense of overall consumer well-being, as some residents would not be able to afford the higher monthly access fees and would be left without internet connectivity, while the remaining served customers would pay prices higher than those that would have prevailed in a more competitive market.

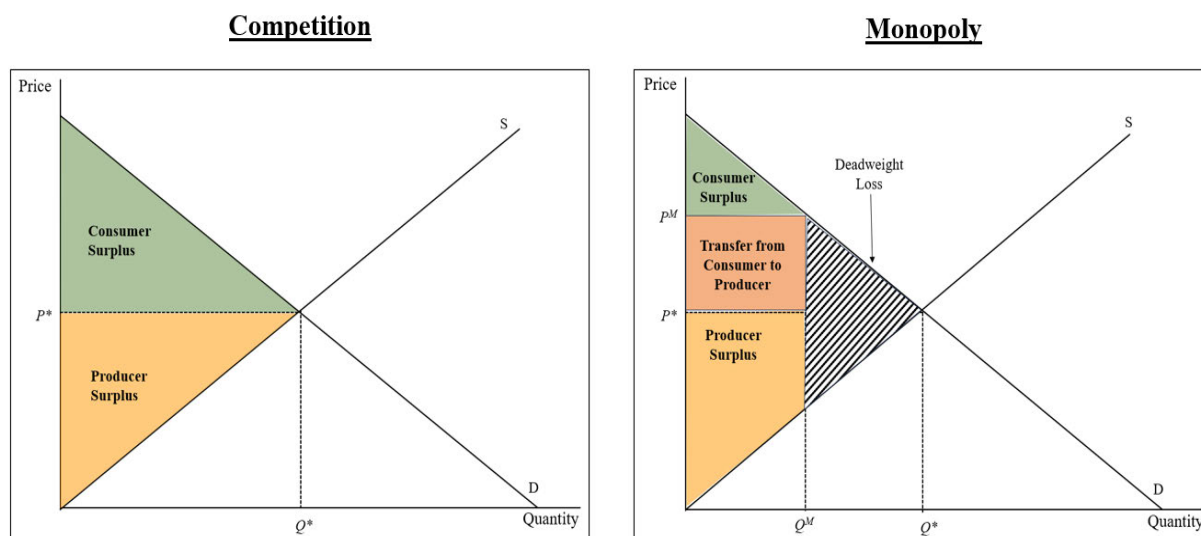
140. While the above example describes the limiting case of a single firm in the market, firms can possess market power even in the presence of other firms. Firms with market power are able to increase their own producer surplus at the expense of consumer surplus. This is not merely a transfer from buyer to seller, but typically results in some absolute surplus loss, because economic activity which should take place is prevented

²³⁸ Taylor, John, and Akila Weerapana, *Principles of Microeconomics*, 6th ed., Cengage Learning, 2007, at p. 284, (“The monopoly exploits its market power by holding back on the quantity produced and causing the price to rise compared with the competitive equilibrium.”).

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from doing so because of the inflated prices and reduced output. Finally, I note that firms with market power may choose to use that power to affect outcomes other than just price and quantity.

Figure 14: Comparing Competitive and Monopolistic Outcomes



141. Figure 14 illustrates how the exercise of market power distorts competitive outcomes.

The left panel depicts the competitive outcome: price and quantity are determined by the intersection of supply and demand. The right panel depicts the outcome under a monopolist: quantity is reduced from Q^* to Q^M , and price is increased from P^* to P^M . Note how the producer surplus increases relative to the competitive outcome, and how that increase comes at the expense of consumers whose surplus is reduced. Finally, note how the distortion introduced by the monopolist leads to an absolute loss in welfare—the so-called *deadweight loss*—from lost transactions. The monopolist has improved his situation, but consumers—and the broader society—are worse off.

202. When the auction is sealed, the bidder does not know the second bid but will instead try to anticipate it. Beliefs regarding other buyers' valuations can come from a myriad of sources, such as past experience or historical data. Information on past auctions can be valuable in helping a participant form an optimal bidding strategy. That information will be more valuable if the past auctions involved many bidders, and this becomes another channel by which the scale of participation in an exchange can potentially make the exchange more attractive to participants.

ii. Second-price Auctions

203. The economic incentives change in a second-price auction, where the auction price is the second bid. Unlike in a first-price auction, bidders in a non-repeated, sealed second-price auction have an incentive to bid at their willingness to pay with no discount or shading.³⁰⁹ Under that strategy, the bidder with the highest willingness to pay will be the auction winner but still capture some auction surplus, since the auction price will be the second bid, and hence lower than the first bid.

204. In such an ideal second-price auction, unilaterally shading a bid is of no benefit and may, in fact, be damaging to the interests of the bidder. Suppose Buyer A's willingness to pay is \$1, while Buyer B's willingness to pay is \$0.90. Assume Buyer B bids her willingness to pay. If Buyer A bids his willingness to pay, he will win the auction and

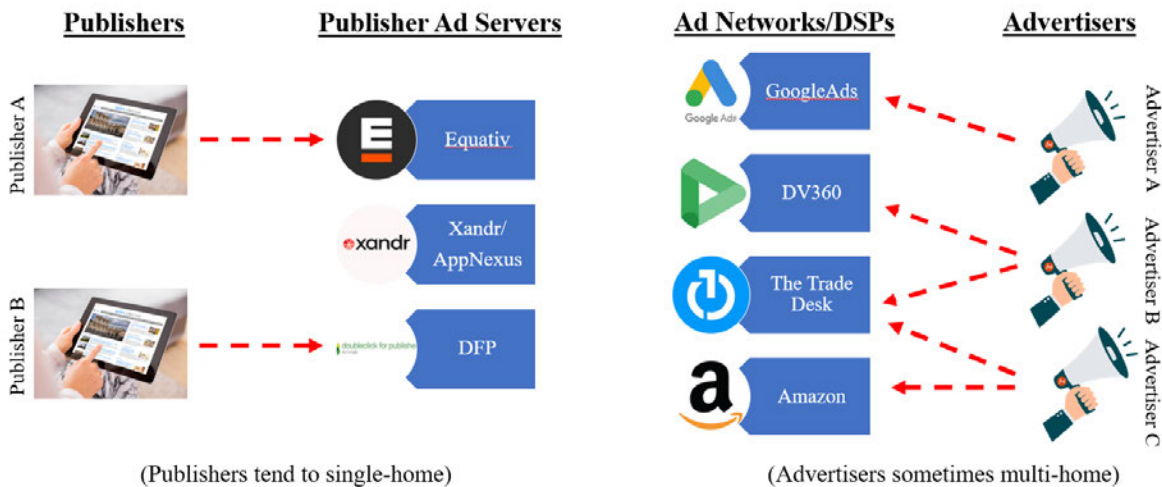
³⁰⁹ McAfee, R. Preston, and John McMillan, "Auctions and Bidding," *Journal of Economic Literature* 25, (1987): 699–738, at p. 708 ("Consider now the second-price sealed-bid auction. In this, each bidder's equilibrium strategy is to submit a bid equal to his own valuation of the item [...] Because [the bidder] would have earned non-negative rents if he won, lowering his bid below his valuation cannot make him better off.").

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“repeatedly reaching the same consumer/group of consumers.”³²⁵

218. Figure 26 illustrates single- and multi-homing patterns by advertisers and publishers across their respective tools.

Figure 26: Advertisers and Publishers Single-homing and Multi-homing Capabilities



2. Multi-homing Over Ad Exchanges

219. Internal Google documents discuss how both publishers and advertisers benefit from access to multiple exchanges. For example, a Google presentation from 2014 explains that publishers benefit from accessing unique demand through different exchanges and from exposure to different pricing algorithms based on differential data availability

³²⁵ “Digital advertising services inquiry, Final Report,” Australian Competition and Consumer Commission, August 2021, available at <https://www.accc.gov.au/system/files/Digital%20advertising%20services%20inquiry%20-%20final%20report.pdf>, last accessed December 7, 2023, at p. 74.

across exchanges.³²⁶ Another internal Google document points out that “[...] all exchanges had access to essentially the same demand. That was except for AdX, which had exclusive access to GDN demand [...] However, it quickly became apparent [publishers] were willing to work with multiple exchanges.”³²⁷ In fact, Header Bidding was a mechanism used by publishers to put an impression up for sale on different exchanges. This allowed publishers to attract more bidders through different demand sources which, as I described previously, raises the expected price of the winning bid, allowing publishers to attain higher revenue.

220. Similarly, advertisers have incentives to multi-home across different exchanges. The same Google presentation also describes “significant advertiser benefit to multihoming” adding that the cost is “low.”³²⁸ The presentation further adds that “[a]dvertisers need to reach all users (as many times as possible).”³²⁹ In fact, Google eventually yielded to this multi-homing pressure with the creation of AWBid to allow Google Ads buyers to bid on limited “supplemental inventory” for remarketing impressions through third-

³²⁶ GOOG-DOJ-29478169, at -172 (Undated).

³²⁷ GOOG-TEX-00138857, at -859 (February 21, 2017) (“Managing multiple ad networks with different static price points had proven to be such a headache for pubs it didn’t seem logical that they would want to go down with the same road with exchanges, especially since all exchanges had access to essentially the same demand. That was except for AdX, which had exclusive access to GDN demand. Exclusive access to the largest ad network in the world and the fact that we had our proprietary contextual targeting algorithm, we assumed that AdX would be the preferred exchange for pub. However, it quickly became apparent pubs were willing to work with multiple exchanges.”).

³²⁸ GOOG-DOJ-29478169, at -172 (Undated) (“Significant advertiser benefit to multihoming, and cost is low”).

³²⁹ GOOG-DOJ-29478169, at -176 (Undated) (“Advertisers need to reach all users (as many times as possible”).

party exchanges.³³⁰ A presentation on 2021 GDA Strategy on AWBid, dated August 2020, indicates that AWBid enabled Google Ads advertisers access to approximately 50 exchanges.³³¹

221. DV360 was designed to work with multiple exchanges.³³² Google's internal documents show that a significant portion of DV360 advertiser spend was on third-party exchanges over the years.³³³

ii. Multi-homing on Both Sides Enhances Competition in the Ad Exchange Market

222. The economics of open web display advertising incentivizes both publisher and advertiser tools to multi-home across exchanges. In a properly functioning and competitive ad exchange market—that is, in a market where, among other things, publisher and advertiser tools are not prevented from multi-homing—this will naturally result in transactions flowing through the lowest cost ad exchange, other things equal.

³³⁰ GOOG-DOJ-09916600, at -600 (Email chain starting on August 16, 2023); GOOG-DOJ-14298902, at -903 (Undated) (“Remarketing is where [GoogleAds] faces the most competitive pressure and most benefit for additional reach.”); and GOOG-DOJ-07227229, at -232 and -244 (September 4, 2014).

³³¹ GOOG-DOJ-AT-00581461, at -463 (August 2020).

³³² See Section II.G.i.

³³³ GOOG-DOJ-03218048, at -049, -050, and -070 (February 5, 2016, “Buyside & Sellside Collaboration” deck, A 2016 presentation indicates that 46% of DBM spend went to AdX.); GOOG-DOJ-12848608, at -617 and -631 (August 22, 2017, “Exchange Buying Dynamics 2017 Quality & Formats Summit,” A 2017 document indicates that AdX is “47% of [DV360].”); GOOG-DOJ-03240266, at -275 and -279 (“DBM/AdX vs. 3P Share Review” deck, A presentation from 2018 notes that the DV360 was buying increasingly on AdX and less from third party exchanges. The third-party revenue share on DBM declined from approx. 43% in Q1 2017 to approx. 35% in Q2 2018); GOOG-DOJ-AT-00060011, at -011, (“Original motivation for Adx 1p auction migration” deck, By January 2019, this share had declined to approx. 30%.); and GOOG-DOJ-11733552, at -553, -559, and -578 (“DV360 optimizations ENG deep dive” deck, A January 2020 presentation noted that as of 2017 “3PE accounted for over 50% of DV360 Spend,” and that currently a “significant portion” of DV360 spend was on third party exchanges. DV360 revenue on 3PEs was around 50% in 2017 and had fallen to below 40% in 2019.).

achieve will matter in the long-term.”³⁵²

F. Digital Advertising Supports Multiple Exchanges

234. The history of the Ad Exchange market demonstrates that digital advertising can and will support multiple ad exchanges. However, the benefits of scale and the strength of indirect network effects, coupled with Google’s anti-competitive conduct that I will discuss later in this Report, work to limit the number of viable exchanges.

235. AdX was not the first advertising exchange to enter the market; Right Media’s RMX exchange launched in 2005, two years before DoubleClick Media launched AdX. In an internal 2010 presentation, Google, itself, ranked Right Media above its own exchange with higher reach/volume than AdX and stated that “Rightmedia is leading the market.”³⁵³ This same presentation notes that “DoubleClick AdExchange and Right Media are by far the largest” amongst ad exchanges and identifies seven rival exchanges.³⁵⁴ By 2015, the Right Media Exchange shut down.³⁵⁵

236. Today, several exchanges still exist in the market, including Index Exchange and OpenX, with Google maintaining the largest share of the market.³⁵⁶ Professor Lee

³⁵² GOOG-DOJ-01778820, at -820 (Email chain starting on January 17, 2003) (“One possible strategy is to transfer to syndication partners the market risk that the CPC advertising area will decline, to bet that our technology will result in higher RPM’s in the medium-term, and to bet that the scale well achieve will matter in the long-term, by making the 3 tactical moves.”).

³⁵³ GOOG-AT-MDL-015269020, at -038 (August 2010).

³⁵⁴ GOOG-AT-MDL-015269020, at -042 (August 2010).

³⁵⁵ Fraser, Jeff, “Yahoo Ad Exchange Closes Its Doors To Publishers,” Marketing, January 13, 2015, available at <https://perma.cc/X3C5-RQQK>, last accessed December 7, 2023.

³⁵⁶ *See, for example*, Lee Report, Section V.C.2.a.

3. Through Project Poirot, Google Directed Transactions to AdX by Lowering Bids to Third-party Exchanges

280. From the launch of real-time bidding and ad exchanges, remnant advertising impressions were predominantly transacted via second-price auctions. Over time, some exchanges began to operate first-price auctions—or hybrids between first- and second-price auctions.⁴¹³
281. As I explain in Section VI.C, different auction types present different bidding incentives to buyers. It is not optimal for advertisers to bid their willingness to pay in first-price auctions, or those that resemble first-price auctions, because advertisers will not extract any surplus from the auction. Consequently, it can be efficient for buyers to “shade” their bids below their willingness to pay when bidding into first-price auctions. Project Poirot is a DV360 program that shades bids into some ad exchanges.
282. Beginning in 2017, Google observed that header bidding frequently meant that DV360 would receive multiple ad requests to bid on the same impressions from different exchanges.⁴¹⁴ DV360 launched a program called “Poirot” to shade its advertisers’ bids depending on certain conditions. Bids were shaded differentially across exchanges ostensibly to optimize advertiser surplus. Google determined the bid shading parameter for each exchange and advertiser pair on the basis of small, frequent experiments as

⁴¹³ See GOOG-AT-MDL-001283581, at -581, -586, -589, and -596 (May 30, 2017, Google document titled “Exchange Auction Format Analysis”) (“[S]ome exchanges appear to simply run first-price ... auctions” ... “AppNexus appears to aggressively use first pricing” ... “OpenX seems to use multiple levels of price floors. The results are somewhat skewed towards first-price, but no soft floors or consistent first-pricing are visible.”).

⁴¹⁴ GOOG-DOJ-10308470, at -470 – 471 (January 15, 2020, Google document titled, “DV360 Supply Path Strategy POV”).

B. Google Exploited Its Market Power to Create Exclusive Pools of Supply and Demand on AdX

292. Taking advantage of its dominant position across the ad tech stack, Google leveraged its market power in the Advertiser Ad Network market and the Publisher Ad Server market to extend market power into the Ad Exchange market by a series of acts that excluded rival exchanges. Specifically, Google granted AdX exclusive access to the unique advertising demand represented by Google Ads. Publishers wishing to sell inventory to that demand had no alternative but to transact the impressions on AdX. At the same time, Google granted AdX an exclusive right of first refusal on DFP inventory. Advertisers wishing to secure top-quality impressions from DFP publishers had no alternative but to transact on AdX.

293. This conduct had the effect of creating exclusive pools of publisher inventory and advertiser demand on AdX. As discussed in this section, by making Google Ads' demand exclusive to AdX, Google foreclosed rival ad exchanges from competing for these transactions at any price. And by making DFP inventory first available exclusively to AdX, Google foreclosed rival ad exchanges from competing for those impressions at any price.

i. Google Restricted Google Ads Exclusively to AdX to Extend its Advertiser Ad Network Market Power to the Ad Exchange Market

294. As a legacy of Google's search ad dominance, Google Ads constituted substantial advertiser demand that could boost revenues for those publishers who were able to

Enhanced Dynamic Allocation (“EDA”).⁴⁸⁸

319. I explain in this section that by preferentially routing the substantial inventory of DFP to its ad exchange first, Google directed impressions to AdX and away from AdX rivals, foreclosing their ability to compete.

1. Dynamic Allocation Grants AdX an Exclusive Right of First Refusal and the “Price to Beat”

320. When DA was introduced to DFP in 2007, open web display advertising impressions in DFP were transacted in two primary ways. Publishers sold premium advertising inventory to ad buyers via direct deals for “guaranteed” impressions, as I describe in Section II.C.i. Inventory not sold through direct deals, i.e., remnant inventory, was offered sequentially to demand sources via a waterfall process that I describe in Section III.C.

321. In the waterfall process, DFP solicits bids from demand sources typically in descending order of the historical average bid the publisher received from the demand source. A remnant impression is allocated to the first demand source that submits a bid greater

⁴⁸⁸ GOOG-AT-MDL-011686728, at -728 (Undated, Google document titled “Enhanced Dynamic Allocation Launch and Improvements”) (“As the primary connection to publishers, DFP helps provide most of the third party premium inventory available to Google, and 70% of AdX(AdExchange)’s revenue is booked through DFP. DFP is a reservation-based ad delivery system while it also drives 2B+ revenue to Google’s auctioned ads services (AdX) via dynamic allocation (also known as backfill). The goal of Enhanced Dynamic Allocation is to send as much “high value” inventory to AdX for monetization while maintaining the pacing of the guaranteed ads in DFP” ... “This project has incredible potential for revenue to the publisher and sends strategically significant high-value inventory to backfill because backfill is allowed to compete much more often. After launching this globally on 2014/05, we are now seeing \$100M+ extra Google annual run rate, and \$500K+ publisher revenue per day because of this change.”).

than a publisher-determined floor price.⁴⁸⁹

322. When Google acquired DFP and AdX, DA was an existing feature of DFP that Google opted to include in the relaunch of AdX in 2009.⁴⁹⁰ According to Google, DA “established a ‘floor price’ for AdX bids to beat, based on the highest price of any of the publisher’s booked, static remnant line items ... AdX buyers would then submit real-time bids to try to beat this floor.”⁴⁹¹ AdX would win the impression if any of its bidders was able to beat the floor price, and if only one eligible bid cleared the floor, that bidder would pay the floor price. This effectively put AdX at the top of DFP’s remnant waterfall.⁴⁹²

323. This granted AdX the opportunity to transact impressions before any other exchange or demand source had an opportunity to bid on them. This advantage was known as “First

⁴⁸⁹ See discussion in Section III.C and Ravi Report, at Appendix C.2.

⁴⁹⁰ GOOG-AT-MDL-006217592, at -605 (December 12, 2022, Google’s Response to the European Commission: “Dynamic Allocation was launched as a new feature in DoubleClick for Publishers (“DFP”) in around July 2007, before Google’s acquisition.”).

⁴⁹¹ GOOG-AT-MDL-006217592, at -605 (December 12, 2022, Google’s Response to the European Commission: Using Dynamic Allocation, DFP established a “floor price” for AdX bids to beat, based on the highest price of any of the publisher’s booked, static remnant line items (which a publisher “booked” by manually configuring the estimated price of each remnant line item or based on a fixed-price the publisher had negotiated with a particular remnant demand partner). AdX buyers would then submit real-time bids to try to beat this floor.”); and Ravi Report, Appendix C.1. and Appendix C.2. See also “Digital Advertising Services Inquiry – Final Report,” Australian Competition and Consumer Commission, August 2021, available at <https://www.accc.gov.au/system/files/Digital%20advertising%20services%20inquiry%20-%20final%20report.pdf>, last accessed December 4, 2023, at p. 10.

⁴⁹² Ravi Report, Appendix C.1. and Appendix C.2.

346. A 2019 Google document defined Last Look as follows:

‘Last Look’ is a term used by some in the industry to refer to the way Dynamic Allocation works. Dynamic Allocation gives AdX the opportunity to compete against all* line items in DFP to help publishers get the most value from every impression. Before Dynamic Allocation calls AdX to run its auction, DFP determines its winning line item and passes a floor price (minimum price) into the AdX auction. This means line items from directly sold campaigns, Ad networks, other SSPs booked directly in DFP, and line items activated by Header Bidding can set the floor price of the AdX auction.⁵²²

347. Google allowed the highest bid from other demand sources to function as the second-price in AdX’s second-price auction, meaning AdX submitted to DFP the greater of (i) the second-highest bid from its auction less the applicable AdX take rate, or (ii) the price to beat, i.e., the floor price, from other demand sources.⁵²³ This meant that Google could win impressions at the winning header bidder price.⁵²⁴ AdX used Last Look to “work out whether it wants to make the final bid.”⁵²⁵

348. Header Bidding interacted with Dynamic Allocation in such a way that no exchange

⁵²² GOOG-DOJ-11030354, at -354 and -355 (Undated, Google document titled, “Comm Doc: DV360/GDA Buyside view on Ad Manager 1P Change”); and *see also* GOOG-AT-MDL-008106705, at -709 (February 2019, Google slide deck titled, “Unified 1st Price Auction”: “This is what the industry refers as ‘last look’, where AdX is called last to see if any bid can beat the remnant price”).

⁵²³ GOOG-DOJ-14024199, at -201 (April 5, 2017, Google slide deck titled, “Exchange Bidding: ‘Last Look’ leak”).

⁵²⁴ GOOG-DOJ-14024199 at -201 (April 5, 2017, Google slide deck titled, “Exchange Bidding: ‘Last Look’ leak”).

⁵²⁵ GOOG-TEX-00103579, at -580 (Google email from Alex Shellhammer, Google product marketing manager, starting on July 12, 2016 regarding questions from a Business Insider reporter.).

1. Google Deprecated Certain AdMeld Functionality After the Acquisition

381. Following its acquisition of AdMeld, Google began migrating some of AdMeld's features into AdX and DFP while also halting the development of AdMeld as a separate product.⁵⁹² Moreover, in 2014, Google began to enforce its policy against AdX integrations to third-party yield managers and exchanges.
382. Specifically, Google did not integrate AdMeld's ability to provide real-time bids into rival publisher ad servers. A 2012 Google document indicated that Google did not plan to adopt AdMeld's ad-server-level API integrations that would "pass real-time AdX pricing into a non-DFP ad server."⁵⁹³ In other Google correspondence from July 2013, Pooja Kapoor wrote that "AdX will not be supporting server-side integrations" in response to a colleague's request for talking points about "our decision not to support server-side API integrations after migration."⁵⁹⁴
383. In 2013, an email from Google executive Scott Spencer indicated that Google's policy to "completely block publishers from running AdX inside of SSPs" (or yield managers) would be enforced in "Q1 2014," explaining:

⁵⁹² See GOOG-TEX-00054421, at -421 (September 14, 2012, Google document titled, "Admeld Migration Design Document"); GOOG-DOJ-04302630, at -643 (February 28, 2012, Google slide deck titled, "Display Strategy Review"); GOOG-DOJ-03603298, at -299 (August 1, 2012, Google document titled, "Admeld Migration (for Sales and Services)"); GOOG-DOJ-03606441, at -442 (September 1, 2012, Google document titled, "Admeld Product and Client Migration – Comms Doc"); and GOOG-DOJ-03540728, at -728 (Google email chain starting on January 23, 2012 with the subject "Re: Admeld Integration – next steps from off-site").

⁵⁹³ GOOG-DOJ-03606441, at -448. (September 1, 2012, "Admeld Product and Client Migration – Comms Doc" Document).

⁵⁹⁴ GOOG-DOJ-04407352, at -352 (July 2013, Google email chain with subject "Re: Sever side APIs").

This was a strategic decision. We allow redirection from 3rd party ad servers, but not from other exchanges or yield managers. Why? Because if we did then those systems would immediately have a super set of demand - anything the SSP had + all of AdX (including AdWords). No one would sign up for AdX directly.⁵⁹⁵

384. A February 2014 Google document titled, “AdX Comms: Server Side Interface for 3rd party ad server dynamic allocation Not Supported” concluded, “[w]e have officially decided to not support server side integration into AdX due to lack of a strong business case.”⁵⁹⁶ The document noted that “Admeld customers who had a server side integration via Admeld” requested to “invoke AdX directly from their ad server, without a client side redirect.” However, Google determined “[t]he only acceptable interface is one where the ad server passes a minCPM to AdX, and if AdX can beat this minCPM, then the query must serve.”⁵⁹⁷

⁵⁹⁵ GOOG-DOJ-14248558, at -558 (March 22, 2013, Google email chain with subject “Re: AdX TOS effectively prohibits publisher from using an adserver?”); GOOG-TEX-00149056, at -057 (Internal Google email chain starting on March 21, 2013 with subject “Re: Fwd: Tribune - Ad Ex tags”: “So just to confirm – by the end of the year, we will completely block publishers from running AdX inside of SSPs from a Policy perspective, but in the interim, if they are not a sub-syndicate partner, they can do it today? Correct. Also, will there ever be a time where we will legally enforce any of this? Yes. In Q1 2014.”); *See also* GOOG-DOJ-03540728, at -728 and -729 (2012 email on “Admeld Integration,” noting “[w]e are consolidating the products to a single offering, based on the AdX product” and “DFP Yield Management effort and coordination[.] Establish a path forward for DFP YM report given the proposal that the functionality be under the ADX contract terms.”).

⁵⁹⁶ GOOG-DOJ-03610002, at -002 (February 2014, Google document titled “AdX Comms: Server Side Interface for 3rd party ad server dynamic allocation Not Supported”).

⁵⁹⁷ GOOG-DOJ-03610002, at -002 and -004 (February 2014, Google document titled “AdX Comms: Server Side Interface for 3rd party ad server dynamic allocation Not Supported”).

397. Google had considered eliminating buyer-specific floors in 2018 in order to “address uneven inventory access due to differential pricing floors between external exchanges and AdX.”⁶²³ Finally, in 2019, Google removed from DFP the capacity for publishers to set distinct floors. Google “removed the ability to set floors per buyer to make it more difficult for the publisher to disadvantage us.”⁶²⁴ One Google executive observed that the “presence of per demand floors really hurts us and has been one of the biggest challenges for AdX as a platform vs some of the other exchanges.”⁶²⁵

398. In place of flexible, buyer-specific floors, Google implemented so-called Unified Pricing Rules (UPR) that required publishers to set a common floor price for all exchanges and ad buyers.⁶²⁶ The move was intended to “improve Google net revenue by mitigating the impact of inventory multi-listing.”⁶²⁷

399. A January 2019 Google slide deck seeking to broadly launch UPR (and the other auction changes jointly termed Unified First Price Auction) identified as the rationale for the auction changes only “improv[ing] AdX competitiveness” by “reduc[ing]

⁶²³ GOOG-TEX-00096393, at -393 (June 21, 2018, Google email correspondence).

⁶²⁴ GOOG-DOJ-AT-01511990, at -992 (August 6, 2020, Google document titled “George: Rahul 1:1 Notes”).

⁶²⁵ GOOG-DOJ-02857290, at -290 (May 11, 2019, Internal Google email from Sagnik Nandy with subject “Re: First-price & Removing pricing knobs”).

⁶²⁶ Bigler, Jason, “An update on first price auctions for Google Ad Manager,” Google Ad Manager Blog, May 10, 2019, available at <https://www.blog.google/products/admanager/update-first-price-auctions-google-ad-manager/>, last accessed December 7, 2023; *See also* Bigler, Jason, “Rolling out first price auctions to Google Ad Manager partners,” Google Ad Manager Blog, September 5, 2019, available at <https://www.blog.google/products/admanager/rolling-out-first-price-auctions-google-ad-manager-partners/>, last accessed December 7, 2023; and *see also* GOOG-DOJ-AT-01139367, at -367 (February 13, 2019, Google document: “. . . allowing publishers to set a single floor across all their demand sources”).

⁶²⁷ GOOG-TEX-00124787, at -788 (July 9, 2018, Google slide deck titled, “DRX Unified Yield Management Strategy Review”).

ability to manage our business in the way we preferred at the time.”⁶⁴⁴

4. Google’s 5% Open Bidding Surcharge to Third-party Exchanges Further Advantaged AdX

405. The harmful effects on Google’s exchange rivals of Google’s UPR adoption were compounded by Google’s imposition of a 5% surcharge on third-party exchanges participating in Open Bidding. DFP imposed the 5% surcharge on third-party exchanges competing in AdX’s real-time auction. The 5% surcharge did not apply to AdX transactions. Given UPR, third parties participating in Open Bidding were required to either (i) submit buyers’ bids that exceeded those of AdX, i.e., have higher demand, or (ii) lower their exchange take rates; otherwise, their bids net of exchange fees would have been lower than the net-bids of AdX, and AdX would have captured the impressions. Thus, the interaction of UPR and the 5% Open Bidding surcharge further harmed competitor exchanges by raising their costs of competing for impressions available in Google’s Open Bidding auction.

5. Unified Pricing Rules Benefited AdX and Excluded Rival Exchanges

406. Consistent with its plan of implementing UPR to make AdX more competitive, Google anticipated that the move to UPR would increase AdX impressions and revenues. In fact, according to one Google analysis from a beta launch of UPR on 10% of “traffic,” the switch to UPR resulted in an 8% increase in DBM revenues and a 39% increase in

⁶⁴⁴ Deposition of Ryan Pauley (Vox), August 23, 2023, 31:11–31:17. (“Q. Okay. Overall, focusing on Vox, would you say that UPR was good or bad for Vox? A. Generally, I would say it was — it was bad in that it limited our ability to manage our business in the way that we preferred at the time.”).

DBM impressions.⁶⁴⁵ Fewer queries had non-zero floors, i.e., more queries had floor prices set at zero, “improving Ad Manager inventory.”⁶⁴⁶ Early Google analysis of the transition to UFPA/UPR indicated that UPR “lowers floors on AdX, providing increased access to inventory for buyers.”⁶⁴⁷ Google also estimated that the floor prices facing Google Ads declined from \$3.31 to \$1.01 under UPR.⁶⁴⁸

407. Vox determined that the share of its impressions transacted on AdX increased from about 50% to 60% after the imposition of UPR, implying fewer Vox impressions were available to other exchanges.⁶⁴⁹ Google also determined that AdX gained a larger share of Weather.com impressions after the shift to UPR due, at least in part, to UPR. And Rubicon Project, a competitor to AdX, experienced a decline in its impression win rate after Google implemented UPR.⁶⁵⁰

408. As a VP of Client Relationships at Freewheel/Comcast observed in email correspondence with a colleague, “Publishers are no longer allowed to favor buyers over other buyers at a platform level ... [B]y making [these changes] mandatory vs optional, they are also controlling the behavior of the pubs. Google is not allowing

⁶⁴⁵ GOOG-DOJ-AT-02204351, at -360 (September 3, 2019, Google slide deck titled, “Changes to Ad Manager, Admob auction”).

⁶⁴⁶ GOOG-DOJ-AT-02204351, at -381 (September 3, 2019, Google slide deck titled, “Changes to Ad Manager, Admob auction”).

⁶⁴⁷ GOOG-DOJ-09713317, at -318 (August 13, 2019, Google internal email from Rahul Srinivasan with subject “Unified Auction Changes (Sellside) Executive Update”).

⁶⁴⁸ GOOG-DOJ-AT-02204351, at -381 (September 3, 2019, Google slide deck titled, “Changes to Ad Manager, Admob auction”); *See also* GOOG-DOJ-09713317, at -321 (August 13, 2019, Google email from Rahul Srinivasan with subject “Unified Auction Changes (Sellside) Executive Update”).

⁶⁴⁹ Deposition of Ryan Pauley (Vox), August 23, 2023, 21:14–22-2.

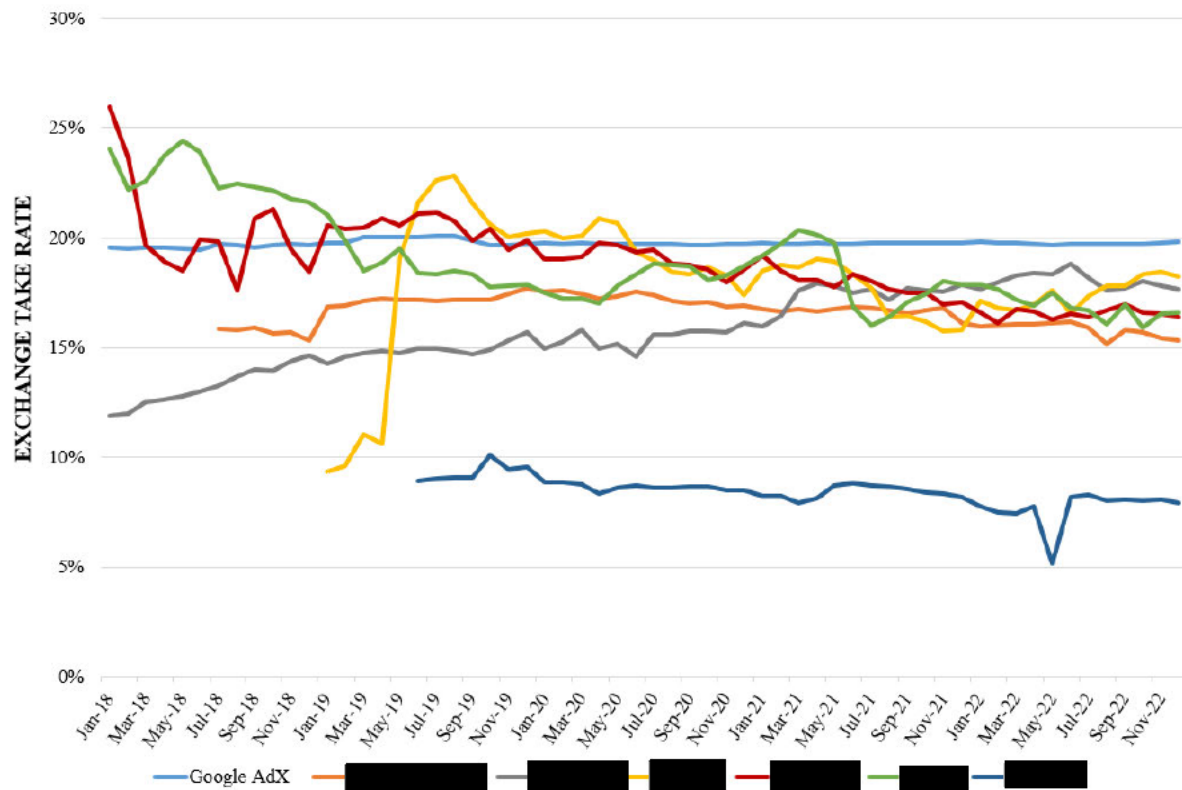
⁶⁵⁰ GOOG-DOJ-15044036, at -037 – 039 (August 22, 2019, Internal email correspondence with subject, “Google and Rubicon Weekly Call Agenda – August 15”).

C. Google Used Its Market Power in the Ad Exchange Market to Set and Maintain a Supra-competitive Price

i. The AdX Take Rate is High and Invariant to Market Forces

468. Google leverages its market power to charge supra-competitive prices in the Ad Exchange market. Using data collected by Professor Lee, I plot the take rates of various ad exchanges, including AdX, in Figure 30 below. The AdX take rate is relatively high, and since mid-2021 is greater than any of the other ad exchange take rates. It also appears unusually stable over time. Other take rates have generally been trending down, but the AdX rate has been nearly constant at just under 20%.

Expert Report of Rosa M. Abrantes-Metz, Ph.D.

Figure 30: Ad Exchange Take Rates

Source: Underlying data from “Exchange take rates.xlsx” in Lee Report backup materials.

469. To compare the magnitude of the variation of AdX’s take rate to that of its competitors over time, I calculate a coefficient of variation for each exchange’s take rate. The coefficient of variation is a measure of the take rate’s dispersion around its mean, and it allows comparison of the variability across different exchanges.⁷²⁵ The coefficients of variation for each exchange’s take rate are presented in Figure 31. AdX’s coefficient of variation is 0.48%, lower than all other exchanges for which I have data. In fact, AdX’s coefficient of variation is approximately one eighth that of

⁷²⁵ Bluman, Allen G., *Elementary Statistics: A Step by Step Approach*, New York: McGraw Hill 7, (2009), at p. 132.